polype-cells; the inner part strengthened with thick, fusiform, longish tubercular spicules with three or five wide, smooth, sunken cross bands, separating the tubercular surface of the middle of the spicules into bands respectively. The spicules in shape are like those figured by Prof. Kölliker, in his 'Icones Histiologicæ,' t. 18. f. 31 & 39, as found in *Gorgonia setosa* and *G. sanguinolenta*; f. 42 & 43, *Gorgonella pseudo-antipathes* and *G. granulata*.

Euselerides chinensis.

Hab. North China. B.M.

Mr. Carter says, "The spicule is calcareous, tubercular, elliptical, presenting from three to five smooth bands, or intervals without tubercles, alternating with the tubercular ones, all forming so many circular rings round the central axis of the ellipse. About twice as long as broad, and $\frac{1}{120}$ inch long.

"There are seldom more than three smooth bands, and these may be more or less irregularly disposed; but the figure given shows the average form and size of the spicules, though taken from one of those which are most symmetrically formed. The whole tissue is pregnant or densely charged with them.

"The magnified surface shows the form of the pits; the larger are situated in the middle of the smaller, cup-shaped ones. The larger ones contain the animal with its eight divisions, showing the dry contracted animal. In the centre of each of the smaller cups is an aperture which may be an outlet for the ova, which abound in the structure round the large cells. Urticating organs are also present."

Mr. Carter has also sent me a drawing, with some interesting details of the structure, of a species of *Spoggodes* which was brought up from the bottom of the sea off the south-east coast of Arabia, on a fishing-hook. The coral was of a "greyish colour, more or less transparent, firmly gelatinous interiorly, semicrusted with rough, fusiform calcareous spicules externally. Animal pinkish, just visible, surrounded by a cupwork of fusiform spines, one of which is much longer than the rest. Skeleton of spine- or spicule-work consisting of different-sized fusiform spicules. The branches are branched, the branchlets short, each ending in a spherical head of polypes more or less bristled by the projecting calcareous fusiform spicules."

The mass is large and short (5 inches each way), with very thick, rather compressed, barren stems, divided above into short, thick, rounded lobes, which are covered with clusters of short branches ending in spherical heads of polypes. I propose to call the species, which is evidently very distinct from any I have before seen, *Spoggodes conglomeratus*.

On the Anatomy of the Genus Gordius. By H. Grenacher.

The singular results obtained by M. Meissner, in his anatomical researches on the Gordiacea, have induced the energetic expression of doubts on the part of several naturalists; the conscientious work of M. Grenacher ought therefore to be welcome to all. The author has

taken as the subject of his dissections some large tropical species, and he has verified the exactness of the results obtained in the *Gordius subbifurcus* of Europe.

We may distinguish, with M. Schneider, in the skin of all the true Nematodes, two layers—the one internal and cellular, lying directly on the muscles, called the subcutaneous layer, and the other external, the cuticle, secreted by the first. The two layers occur in exactly the same way among the Gordiacea; but M. Meissner entirely misunderstood their nature. He considered the subcutaneous layer as being in direct relation with the muscular system, and gave it the name of perimysium. As to the cuticle, it is formed of two laminæ, of which the innermost was regarded by M. Meissner as a fibrillar corium, and the external as an epidermis of cellular nature.

In immediate dependence upon the skin is the organ which M. Meissner has described as a *ventral nervous cord*. M. Schneider was afterwards better inspired in regarding this cord as the homologue of the ventral line of the Nematodes. Nevertheless, in his monograph of the Nematodes, he abandons this opinion and regards the cord in question as an œsophagus deprived of all communication with the intestine—that is to say, as the morphological equivalent of an œsophagus, not fulfilling the functions generally supposed to belong to that part. It does not, indeed, present any mouth in front, or any communication with the intestine behind. This interpretation is energetically opposed by M. Grenacher. This observer recurs to the first idea of M. Schneider, and regards the supposed nervous cord as homologous with the ventral line of the Nematodes. He shows besides, by means of a series of very convincing sections, that this organ is really an excrescence of the subcutaneous layer. A narrow fissure of the muscular cylinder along the ventral line permits a lamina to pass, which establishes the continuity of the tissue between the subcutaneous layer and the ventral cord.

The muscular system of the body of *Gordius* forms in the interior of the subcutaneous layer a cylindrical layer, interrupted only along the ventral surface by the gap through which the ventral cord communicates with the subcutaneous layer. This cylinder is composed of laminæ, which M. Schneider compares with the fibrillæ of the other Nematoda. M. Grenacher, on the contrary, regards each lamina as a muscular cell, homologous with those of the Polymyaria. These laminæ, indeed, are not solid, but each constitutes a tube, though, it is true, of very small calibre. The calibre is directly comparable to the medullary mass of the muscles in the other Nematoda. The author has not, however, succeeded in finding the nucleus of these muscular cells.

The tube formed by the different layers of the body-wall that we have just described is filled with a cellular tissue, in which the other organs are immersed. This tissue is designated by M. Grenacher the *perienteric connective substance*. It is to it that M. Meissner, by a curious interpretation, ascribed the function of an intestinal canal. He assumed, in fact, that the mouth led directly into the cavity filled by this tissue; so that the genital organs would have been lodged in

a solid intestinal canal filling all the body. M. Schneider has already rejected this curious interpretation; but he regards the perienteric tissue as a dependence of the muscular tissue, of which it would represent the medullary substance extraordinarily developed.

It is generally admitted that the Gordiacea are without internal organs of reproduction so long as they lead the life of parasites. This may be true of *Mermis*; but as regards *Gordius* M. Grenacher shows that the generative organs are already completely developed during the phase of parasitism. It is not true that in these animals the intestine terminates cæcally, and that there does not exist any opening playing the part of an anus. In the females the intestine opens into the uterus immediately in front of the sexual pore, so that this last is in reality the opening of a cloaca. The uterus, however, soon divides into three canals, of which the two lateral are the oviducts, and the middle one is the direct continuation of the uterus, but performs the part of a seminal receptacle. In the males there also exists a cloaca in the form of a sac, presenting three orifices—one, superior and median, leading into the intestine, the other two, smaller and lateral, corresponding to the deferent canals.

The variable statements of authors with regard to the digestive system of the Gordiacea are explained by the following facts, ascertained by the author. So long as they are in the state of parasites, the *Gordii* present a distinct mouth leading directly into an intestinal canal lined with epithelium; but at the time of migration, or immediately before it, the mouth appears to be obliterated in the greater number of species. It disappears then entirely, or there only remains a slight, scarcely perceptible, trace of it. The anterior part of the intestinal canal seems also to become atrophied, and the place that it occupied before is henceforth filled with the perienteric tissue. These remarkable modifications had already been foreseen by M. Blanchard. In 1849, he expressed himself as follows:—"We remark in the *Gordii*, at least in the adults, the atrophy of the intestinal canal. This suffices, up to a certain point, to separate the Gordiacea from the Nematoïdes; and yet we are not in a position to describe clearly the digestive tube of a single *Gordius*, for it would be necessary to have observed it at different ages of the life of the animal." Most zoologists of late years have approximated the *Gordii* to the Nematodes. Diesing has formed, under the name of *Nematoda aprocta*, a group including *Mermis*, *Gordius*, and the *Sphærulariæ*. The name proposed by the Viennese naturalist, at all events, cannot be maintained: in the first place, the absence of an anus (true, perhaps, as regards *Mermis* and the *Sphærulariæ*) will not hold good in *Gordius*; in the second place, we know now of true Nematodes appearing to be without any anal opening whatever (*Ichthyonema*). The results obtained by M. Grenacher seem to remove the genus *Gordius*, more than is generally supposed, both from the true Nematodes and from *Mermis*. M. Schneider has already pointed out a certain number of differential characters. To these we must now add the existence of a cloaca in both sexes of *Gordius*, in the male sex only of the Nematodes; then the existence in *Gordius* of that con-

nective perienteric tissue, in the parenchyma of which the internal organs are lodged and fixed. Hence M. Grenacher concludes that it is necessary to separate *Gordius*, more than is usually done, both from *Mermis* and from the true Nematodes, at the same time approximating *Mermis* to the latter.—*Zeitschr. für wiss. Zoologie*, xviii. p. 322; *Bibl. Univ.* August 15, 1869, *Bull. Sci.* pp. 308–311.

On the Development of Pelobates fuscus, *Wagl.*
By C. van Bambeke.

The author treats of a subject which has not hitherto been investigated—the embryogeny of *Pelobates fuscus*. His history of its development commences with the ovarian egg, and closes at the period when the internal branchiæ replace the external branchiæ—that is to say, when the principal organs are sketched out. He first of all describes the process which he has followed in making his preparations. The object is to obtain sections sufficiently delicate for microscopic examination by transmitted light, this method being the only one which leads to positive results in the anatomical investigation of the various phases of embryonic development. For further details the reader must refer to the memoir.

The ovum is described, with the appearance which it presents in the ovary. The deposition of the secondary vitellus in the protoplasm of the primordial ovum takes place uniformly round the germinal vesicle, and not in the form of a nucleus; the germinal vesicle is enclosed in a cavity closely approximated to the periphery of the ovum, and has no external communication by a canal; the rupture of the germinal vesicle always precedes the quitting of the ovary by the ovum; and there is no true vitelline membrane (*Eizellmembran* of Remak). These are the chief peculiarities presented by the ovum before its extrusion.

In the upper hemisphere of the fecundated ovum a clear solid nucleus makes its appearance; this becomes the starting-point of the segmentation, which sometimes commences upon the very border of the germinal pit (*fovea germinativa* of Schultze). The circlet of folds (*Faltenkranz* of the Germans) is very distinct in the ovum of *Pelobates* during the first phases of segmentation. The division into two spheres takes place in such a manner that the part still undivided, instead of being central, occupies the periphery of the ovum, and corresponds to the inferior pole.

The formation of the primitive visceral cavity results from the multiplication of the cells of the deeper layer of the dome which covers the cavity of segmentation. In consequence of this cellular prolification, the above-mentioned layer is incurved and covers the clear hemisphere. As soon as the primitive visceral cavity has replaced the cavity of segmentation, the embryonal lamellæ are distinct. Of these there are four, namely:—

1. An external lamella (enveloping membrane).